Statistics 552 APPLIED STOCHASTIC PROCESSES
Spring 2016

Also see Course Announcement

Instructor: Marek Kimmel, Professor, DH 2102, x 5255, kimmel@rice.edu.
TA: Andrew Chapple Andrew.g.chapple@rice.edu

Evaluation
1/3 homeworks, 1/6 midterm, 1/2 final
Optional assignments and activity in class (asking questions) may provide extra credit

Honor Code
Homeworks can be discussed in groups. Final redaction has to be done personally. Verbatim copying of homework assignments is a violation.

Tests (in class) are under strict Honor Code rules and have to be completed without collaboration or help from others.

Attendance: Essential, though not enforced administratively

Text:
Basic: Grimmett and Stirzaker "*Probability and Random Processes*" (3 ed.) Oxford, 2001 (reprinted last time 2009)
Course material Parts of Chapters 5, 6, 7, 10, 12 and 13
Background material (helpful) Chapters 1 - 4
Additional material on Brownian motion from Resnick "*Adventures in Stochastic Processes*"
Additional material on MCMC from source TBA

Lecture Notes and Study Guides: The class will be taught by performing mathematical derivations on the whiteboard with a sporadic use of projected slides. Study guides will be issued ahead of each test.

Problem solving sessions: TA will call these at least once each two weeks.

Office hours: TA: To be announced.
One-to-one meetings with Prof. Kimmel, by appointment

Contents of the course (tentative; a partial overhaul is planned):

1. **Generating functions and their applications**
2. **Markov chains**
3. **Application of Markov chains in statistics: Markov Chain Monte Carlo**
4. **Convergence of random variables**
5. **Renewal processes**
6. **Martingales**
7. **Brownian Motion**

Course objectives and outcomes:

1. Develop understanding of the mathematical structures underlying time (and other) series influenced by chance.
2. Develop skills and appreciation for mathematically rigorous statements and proofs.
3. Provide foundations for applying stochastic processes theory in biology and other fields.
4. Practice the transition from heuristic understanding of the problems to placing them in the frame of the theory and developing solutions

Outcome: A personal toolbox of techniques to address problems in applications and advanced theory.

Students with disabilities are encouraged to attend: Regarding accomodations, please contact both the instructor and Disability Support Services at: http://dss.rice.edu/Content.aspx?ekfrm=2147483651 In particular: A student with a disability has a responsibility to contact DSS if any accommodations are required. If accommodations are needed, the student with a documented disability will receive an accommodation letter from DSS to take to each instructor. It is the student's responsibility to deliver these letters as soon as possible. Instructors expect to receive notification early in each semester; students who deliver their letters later may encounter difficulties. Good, early communication is vital to the accommodation process.

Changes: The syllabus is subject to change with reasonable advance notice by the instructor.